National Institute of Environmental Health Sciences

Contribution of dust storms to PM10 levels in an urban arid environment

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Abstract:

Quantitative information on the contribution of dust storms to atmospheric PM10 (particulate matter with an aerodynamic diameter < or Euro Surveillance (Bulletin Europeen Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 10 microm) levels is still lacking, especially in urban environments with close proximity to dust sources. The main objective of this study was to quantify the contribution of dust storms to PM10 concentrations in a desert urban center, the city of Beer-Sheva, Negev, Israel, during the period of 2001-2012. Toward this end, a background value based on the "dust-free" season was used as a threshold value to identify potentially "dust days." Subsequently, the net contribution of dust storms to PM10 was assessed. During the study period, daily PM10 concentrations ranged from 6 to over 2000 microg/m3. In each year, over 10% of the daily concentrations exceeded the calculated threshold (BVt) of 71 microg/m3. An average daily net contribution of dust to PM10 of 122 microg/m3 was calculated for the entire study period based on this background value. Furthermore, a dust storm intensity parameter (Ai) was used to analyze several storms with very high PM10 contributions (hourly averages of 1000-5197 microg/m3). This analysis revealed that the strongest storms occurred mainly in the last 3 yr of the study. Finally, these findings indicate that this arid urban environment experiences high PM10 levels whose origin lies in both local and regional dust events. IMPLICATIONS: The findings indicate that over time, the urban arid environment experiences high PM10 levels whose origin lies in local and regional dust events. It was noticed that the strongest storms have occurred mainly in the last 3 yr. It is believed that environmental changes such as global warming and desertification may lead to an increased air pollution and risk exposure to human health.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution, Extreme Weather Event

Air Pollution: Particulate Matter

Extreme Weather Event: Other Extreme Event

Extreme Weather Event (other): dust storms

Geographic Feature:

resource focuses on specific type of geography

Desert, Urban

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Asia

Asian Region/Country: Other Asian Country

Other Asian Country: Israel

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified